

CLAIMS

1. A method of establishing a communication link between a mobile station and a base station in a wireless data communication system having a plurality of base stations and a plurality of mobile stations, wherein transmissions from the base stations to the mobile stations are made via forward radio channels and wherein transmissions from the mobile stations to the base stations are made via reverse radio channels, each reverse channel having an associated and corresponding forward channel in a one-to-one relationship, and wherein each forward channel includes a control channel, and wherein each reverse channel includes at least one access channel and a plurality of traffic channels, comprising the steps of:
 - a) randomly selecting a reverse channel for transmitting a traffic channel request from a requesting mobile station to a selected base station;
 - b) transmitting a traffic channel request to the selected base station using a selected access channel of the reverse channel selected in step (a); and
 - c) communicating with the selected base station using both the selected reverse channel and an associated corresponding forward channel.
2. The method of establishing a communication link of claim 1, wherein the communicating step (c) occurs immediately after transmitting the traffic channel request.
3. The method of establishing a communication link of claim 1, wherein the transmitting step (b) comprises sending an access probe to the selected base station over an access channel of the selected reverse channel.
4. The method of claim 3, wherein the access probe comprises a pilot preamble, a traffic channel request, and a pilot/data request channel (DRC) field.
5. The method of claim 4, wherein the pilot preamble comprises a known sequence of data that is easily detected by the selected base station.
6. The method of claim 1, wherein the traffic channel request includes identifying data that identifies the requesting mobile station to the selected base station.

7. The method of claim 6, wherein the identifying data comprises a mobile station identifier (MSI) previously assigned to the requesting mobile station during a registration procedure.
8. The method of claim 4, wherein the traffic channel request includes a transaction identifier, a reference pilot, a pilot strength indicator, and a timer status field.
9. The method of claim 4, wherein the DRC includes traffic channel data rate information that is used by the requesting mobile station to request the maximum data rate from the selected base station that the requesting mobile station can reliably demodulate.
10. The method of claim 4, wherein the mobile station continues to transmit the pilot/DRC field for a time period defined by an access probe tail.
11. The method of claim 10, wherein the time period defined by the probe tail is advertised by the selected base station on the associated and corresponding forward channel.
12. The method of claim 4, further comprising the step of (d) receiving a traffic channel assignment message that is transmitted by the selected base station on the associated and corresponding forward channel.
13. The method of claim 12, wherein the traffic channel assignment message is transmitted at a data rate determined by the requesting mobile station and defined in the DRC field.
14. The method of claim 1, wherein the wireless data communication system comprises a high-speed CDMA system.
15. The method of claim 14, wherein the high-speed CDMA system provides packet data connectivity between the plurality of base stations and the plurality of mobile stations.

16. The method of claim 1, wherein the requesting mobile station transmits the traffic channel request to a base station that is transmitting the strongest received pilot signal to the requesting mobile station.

17. The method of claim 3, wherein the access probe is masked using a long code cover comprising an access channel cover and a mobile station identifier (MSI) cover code.

18. The method of claim 3, wherein the requesting mobile station transmits a sequence of the access probes of increasing power until the traffic channel request attempt is either successful or the traffic channel request attempt terminates.

19. The method of claim 1, wherein the selected base station advertises a group of available power control sub-channels, and wherein the requesting mobile station selects one of the available power control sub-channels for use in subsequent communications with the selected base station.

20. The method of claim 1, wherein the selected base station advertises a list of available traffic channels and associated corresponding available power control sub-channels, and wherein the requesting mobile station selects one of the available traffic channels and sub-channels for use in subsequent communications with the selected base station.

21. A method of establishing a communication link between a mobile station and a base station in a wireless data communication system having a plurality of base stations and a plurality of mobile stations, wherein transmissions from the base stations to the mobile stations are made via forward radio channels and wherein transmissions from the mobile stations to the base stations are made via reverse radio channels, each reverse channel having an associated and corresponding forward channel in a one-to-one relationship, and wherein each forward channel includes a control channel and a plurality of forward traffic channels, and wherein each reverse channel includes at least one access channel and a plurality of reverse traffic channels, comprising the steps of:

- d) directing all base stations within a selected mobile station's paging radius to transmit page messages to the selected mobile station via the control channel;
- e) monitoring the control channel page messages received by the selected mobile station;
- f) detecting whether a page message is addressed to the selected mobile station;
- g) selecting a reverse traffic channel to use for transmitting a traffic channel request whenever the selected mobile station detects a page message addressed to it in step (c);
- h) transmitting a traffic channel request to a selected base station using the reverse traffic channel selected in step (d); and
- i) communicating with the selected base station using both the selected reverse traffic channel and an associated corresponding forward traffic channel.

22. The method of establishing a communication link of claim 21, wherein the communicating step (f) occurs immediately after transmitting the traffic channel request in step (e).

23. The method of establishing a communication link of claim 21, wherein the transmitting step (e) comprises sending an access probe to the selected base station using an access channel of the selected reverse channel.

24. The method of claim 23, wherein the access probe comprises a pilot preamble, a traffic channel request, and a pilot/data request channel (DRC) field.

25. The method of claim 21 wherein the selected base station advertises a group of available power control sub-channels, and wherein the selected mobile station selects one of the available power control sub-channels for use in subsequent communications with the selected base station.

26. The method of claim 21, wherein the selected base station advertises a list of available traffic channels and associated corresponding available power control sub-channels, and wherein the selected mobile station selects one of the available traffic channels and sub-channels for use in subsequent communications with the selected base station.

27. A traffic channel assignment mechanism for rapidly assigning traffic channels in a wireless data communication system having a plurality of base stations and a plurality of mobile stations, wherein transmissions from the base stations to the mobile stations are made via forward radio channels and wherein transmissions from the mobile stations to the base stations are made via reverse radio channels, each reverse channel having an associated and corresponding forward channel in a one-to-one relationship, and wherein each forward channel includes a control channel and a plurality of forward traffic channels, and wherein each reverse channel includes at least one access channel and a plurality of reverse traffic channels, comprising:

- j) means for selecting a reverse channel to use for transmitting a traffic channel request from a requesting mobile station to a selected base station;
- k) means, responsive to the reverse channel selecting means, for transmitting a traffic channel request to the selected base station via a selected access channel of the selected reverse channel; and
- l) means, for communicating digital data information with the selected base station using a selected traffic channel of the selected reverse channel and an associated corresponding forward traffic channel.

28. A computer program executable on a general purpose computing device, wherein the program is capable of establishing a communication link between a mobile station and a base station in a digital cellular communication system comprising a plurality of mobile stations and a plurality of base stations, and wherein transmissions from the base stations to the mobile stations are made using forward radio communication links and wherein transmissions from the mobile stations to the base stations are made using reverse radio communication links, comprising:

- m) a first set of instructions for selecting a reverse communication link for use in transmitting a traffic channel request from a requesting mobile station to a selected base station;
- n) a second set of instructions for transmitting a traffic channel request to the selected base station over the selected reverse communication link; and
- o) a third set of instructions for transmitting data from the requesting mobile station to the selected base station using the selected reverse communication link, and for receiving data from the selected base station using an associated corresponding forward communication link.

29. The computer program of claim 28, wherein the program is executed by a general purpose computing device in the requesting mobile station and in the selected base station.

30. The computer program of claim 28, wherein the program is executed by a field programmable gate array device.